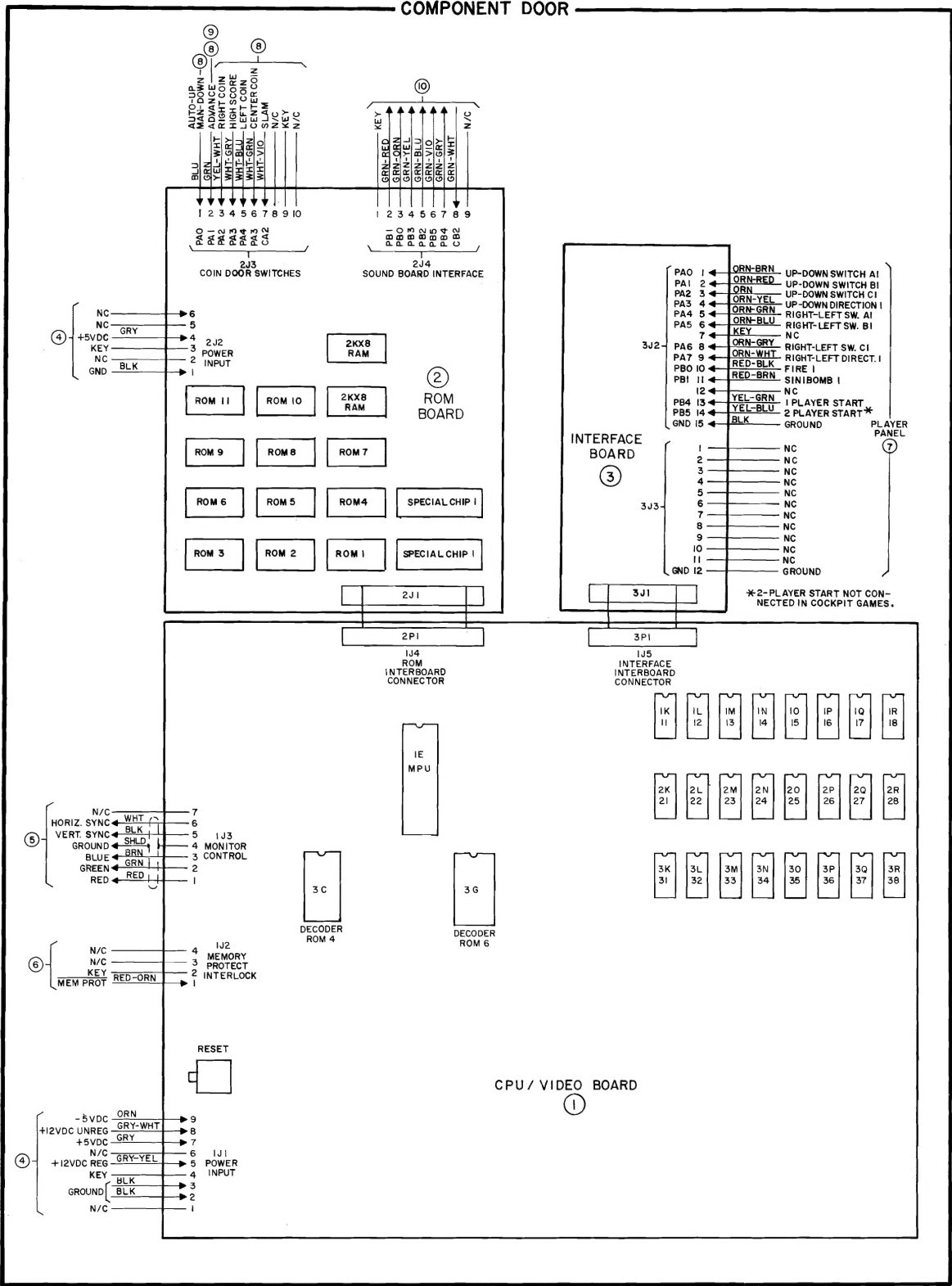


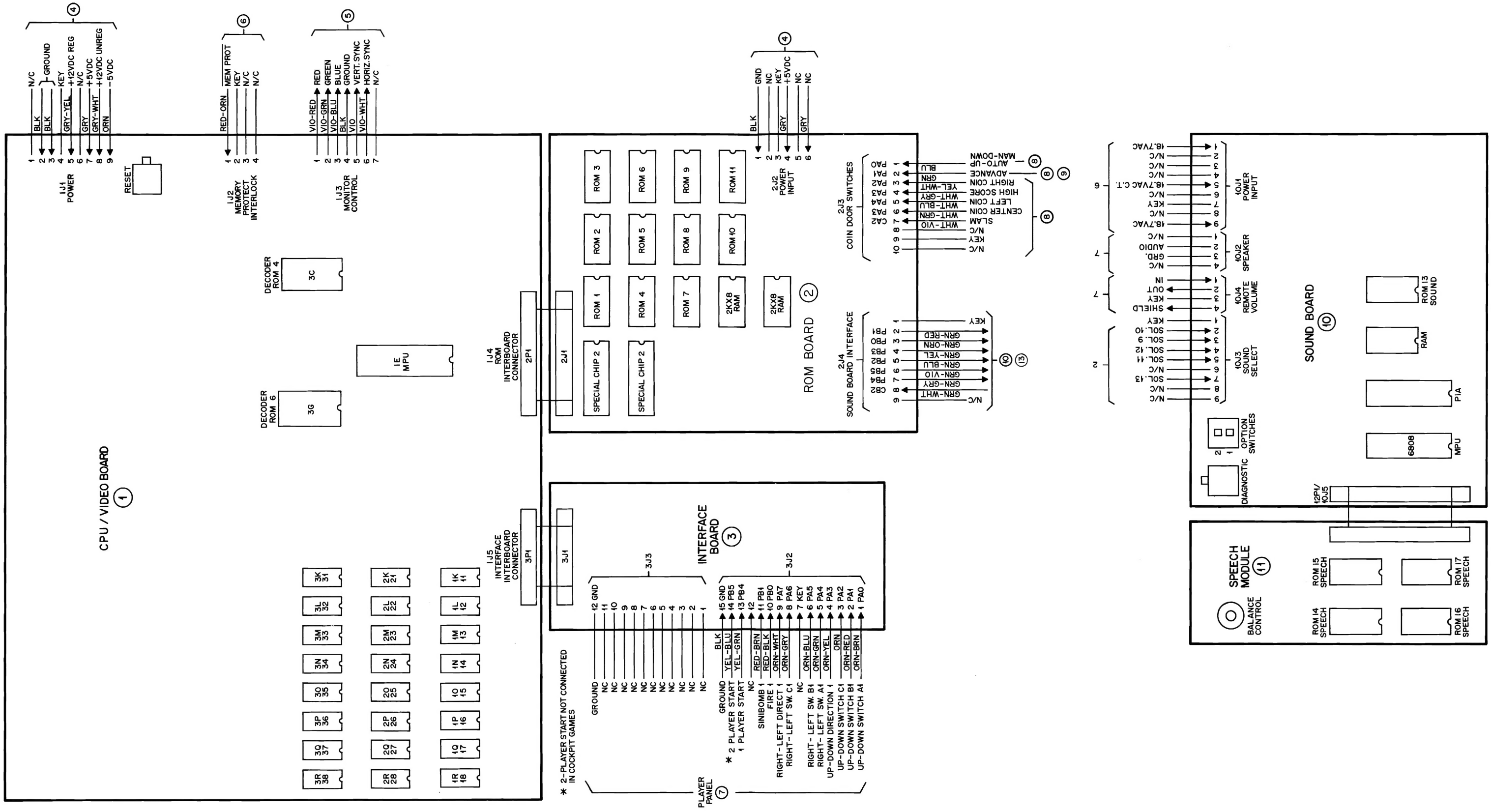
Williams®

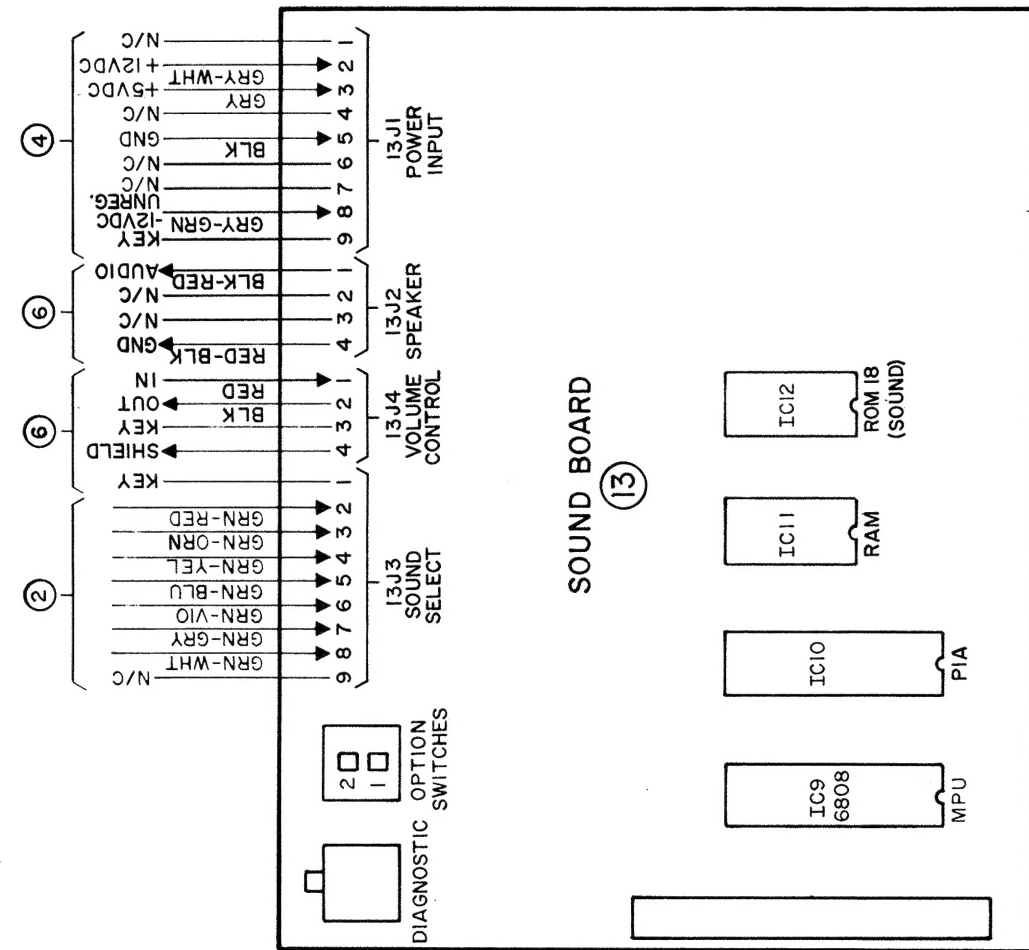
Drawing Set



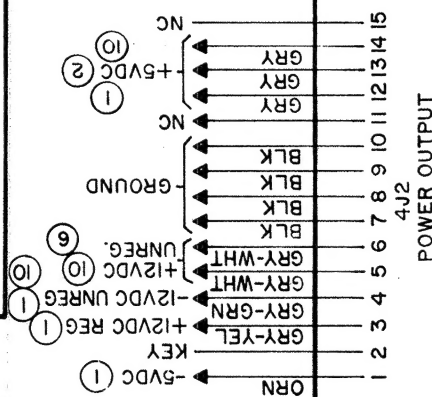
INTERBOARD WIRING



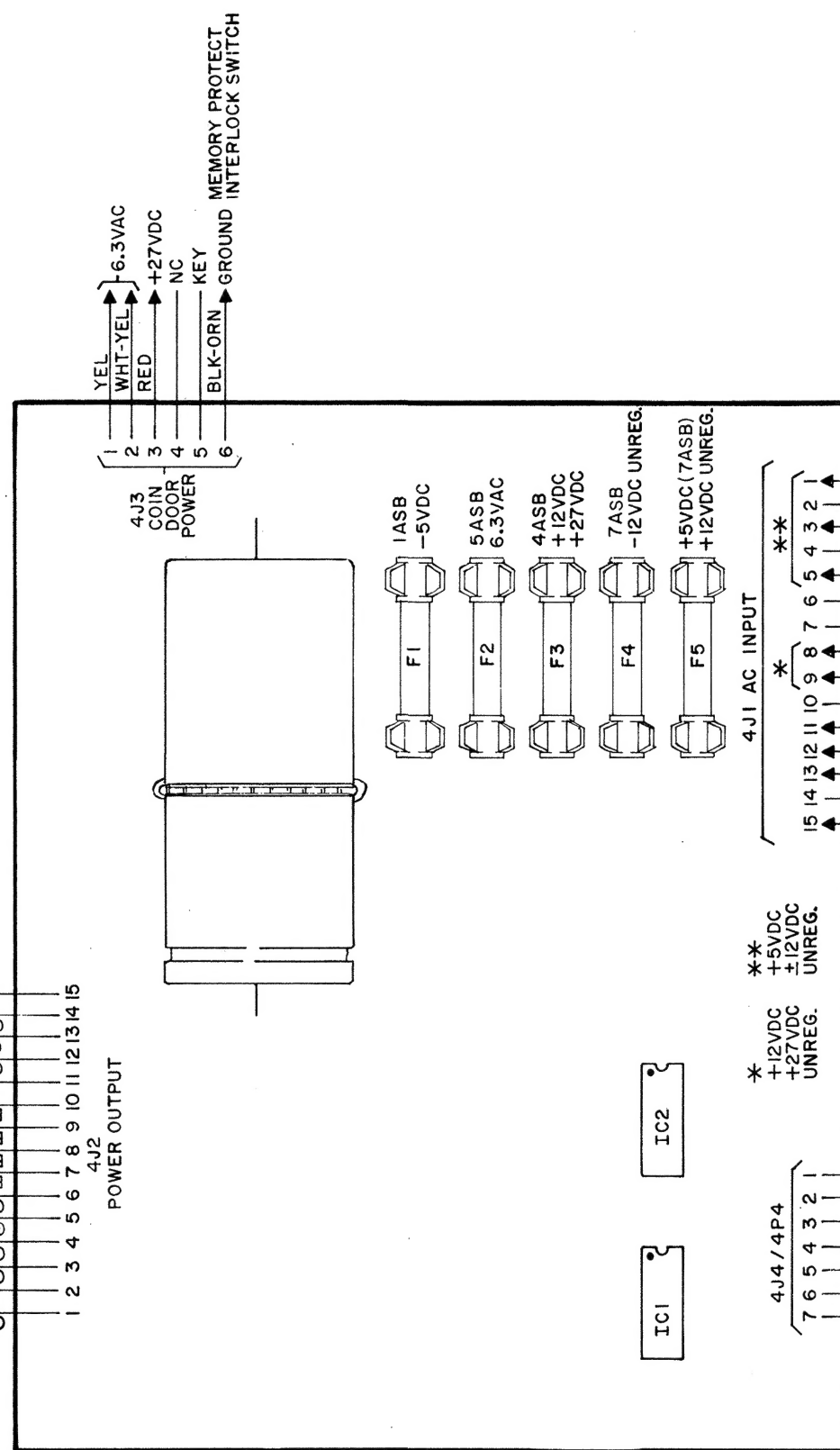




REAR VOL. CONT.



FRONT VOL. CONT.



IC1

IC2

4J4/4P4

7 6 5 4 3 2 1

EMITTER BLU, BASE BLK, COLLECTOR GRN, EMITTER WHT, BASE YEL

FROM TRANSFORMER

6.3VAC WHT-YEL, 11.5VAC VIO-YEL, 20VAC GRY-WHT, GRY-YEL, KEY, NC, GRN, NC, 22.6VAC GRY-GRN, NC, 22.6VAC BLK, 22.6VAC

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

4J1 AC INPUT

1ASB -5VDC, 5ASB 6.3VAC, 4ASB +12VDC +27VDC, 7ASB -12VDC UNREG., +5VDC (7ASB) +12VDC UNREG.

4J3: YEL, WHT-YEL, RED, NC, BLK-ORN, GROUND, MEMORY PROTECT INTERLOCK SWITCH

ORN, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

GRN-YEL, GRY-GRN, GRY-WHT, +12VDC UNREG., -12VDC UNREG., BLK, BLK, BLK, BLK, BLK, BLK, GRY, GRY, +5VDC, NC, NC

13J3 SOUND SELECT, 13J4 VOLUME CONTROL, 13J1 POWER INPUT

IC9 6808 MPU, IC10 PIA, IC11 RAM, IC12 ROM 18 (SOUND)

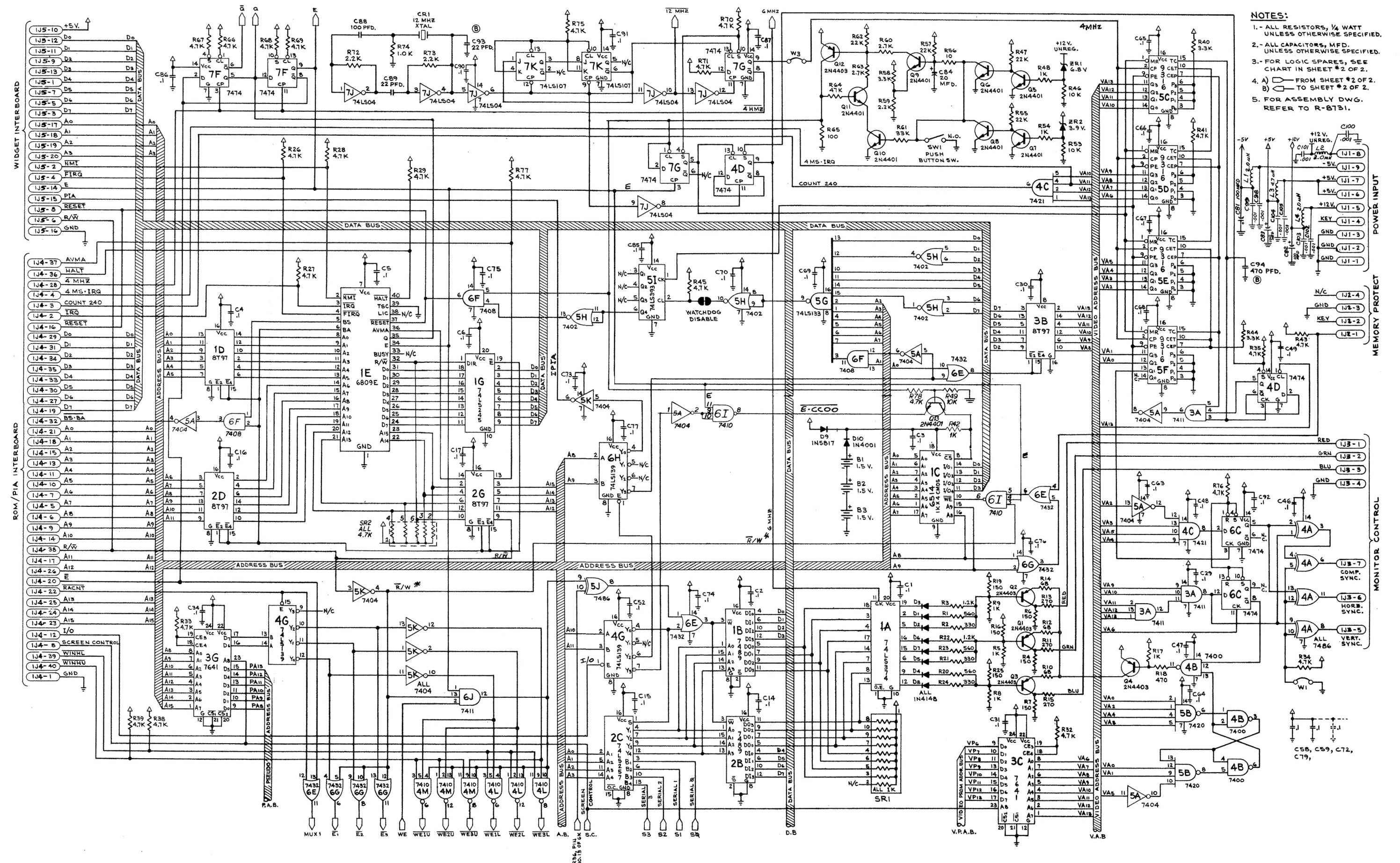
DIAGNOSTIC OPTION SWITCHES

Wiring connections for the Sound Board include:

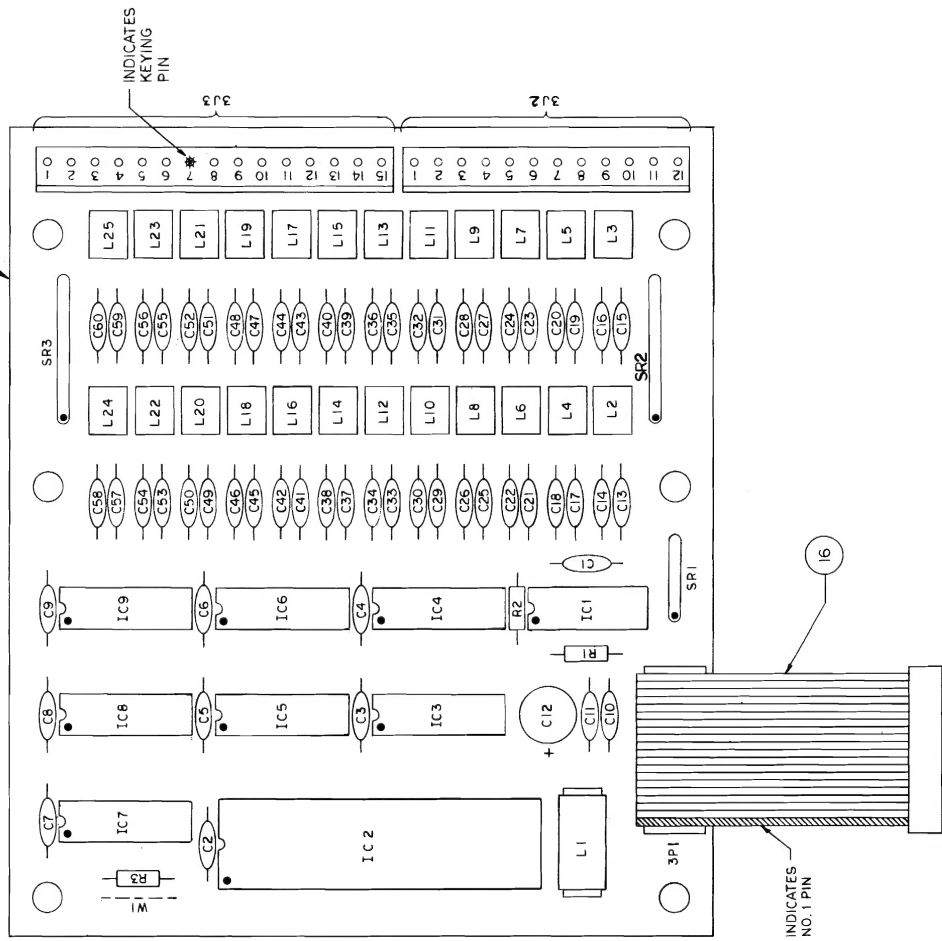
13J3: GRN-WHT, GRN-GRY, GRN-VIO, GRN-BLU, GRN-YEL, GRN-ORN, GRN-RED, KEY, SHIELD, BLK, RED, IN, OUT, N/C, BLK-RED, AUDIO, KEY, GRY-GRN, UNREG., -12VDC, N/C, GND, N/C, +5VDC, GRY-WHT, +12VDC, N/C.

13J4: KEY, SHIELD, BLK, RED, IN, OUT, N/C, BLK-RED, AUDIO, KEY, GRY-GRN, UNREG., -12VDC, N/C, GND, N/C, +5VDC, GRY-WHT, +12VDC, N/C.

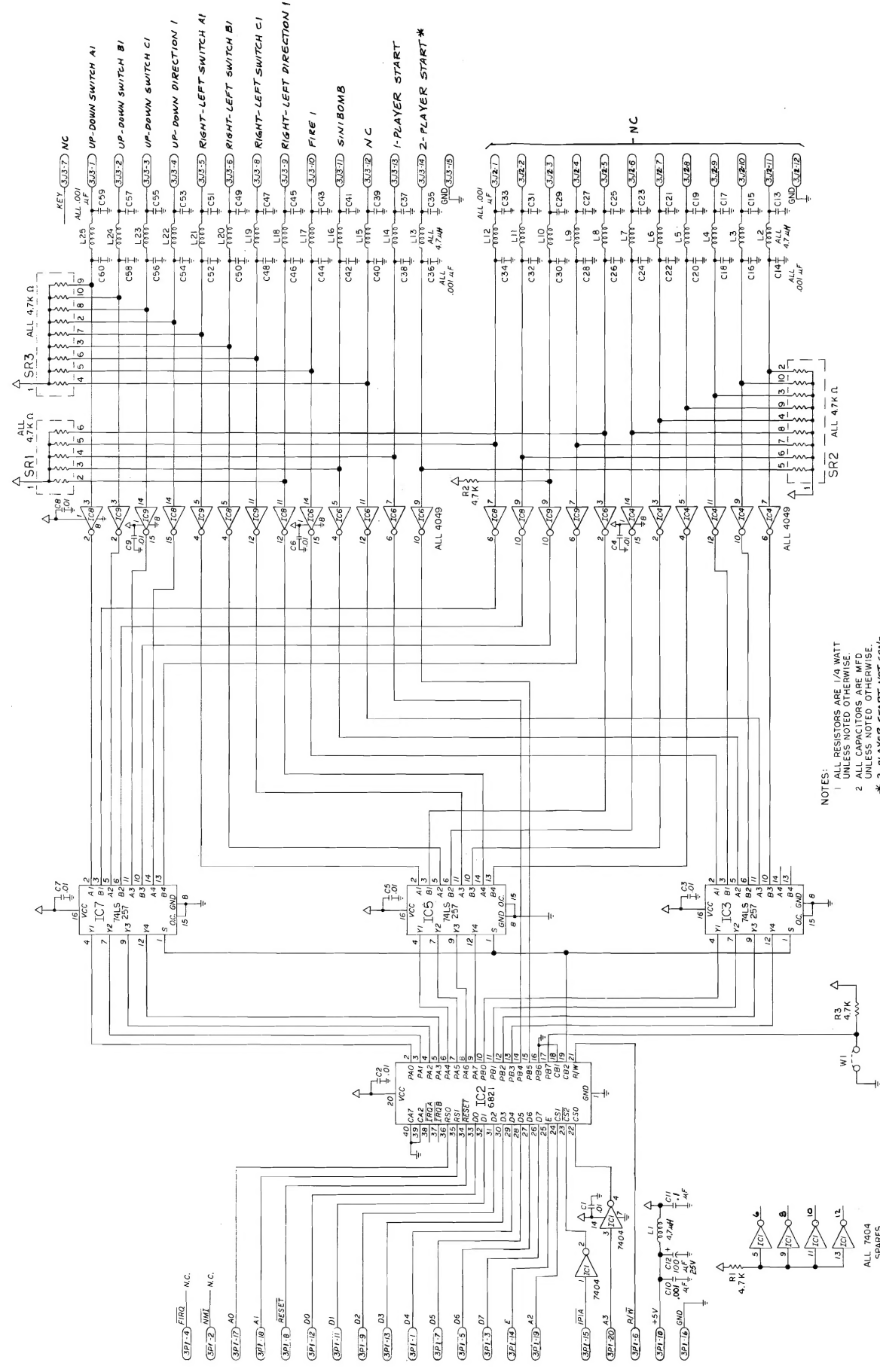
13J1: GRN-WHT, GRN-GRY, GRN-VIO, GRN-BLU, GRN-YEL, GRN-ORN, GRN-RED, KEY, SHIELD, BLK, RED, IN, OUT, N/C, BLK-RED, AUDIO, KEY, GRY-GRN, UNREG., -12VDC, N/C, GND, N/C, +5VDC, GRY-WHT, +12VDC, N/C.



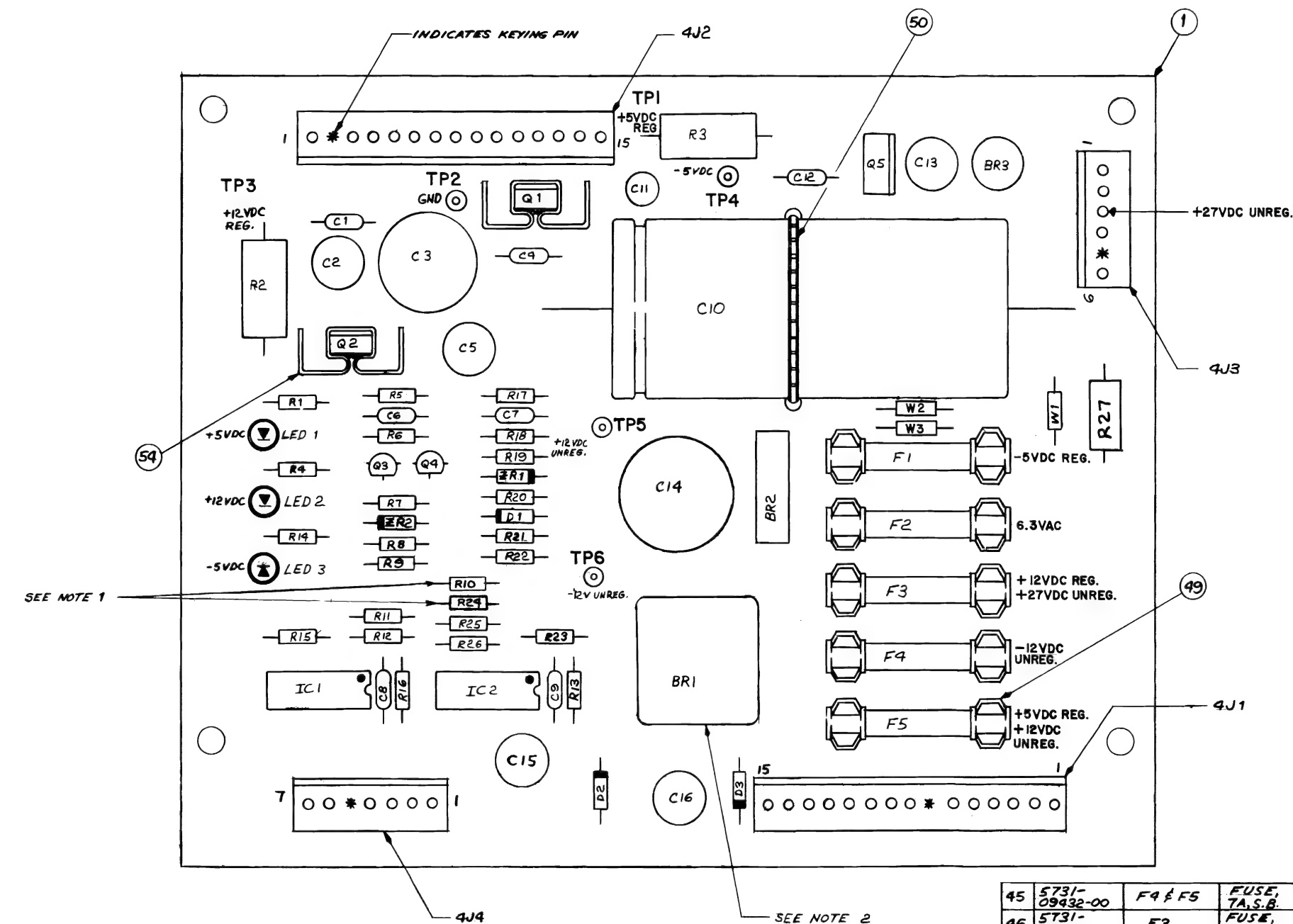
R-8731 CPU Board Logic Diagram
(Sheet 1 of 2)



BILL OF MATERIAL				
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	NO. REQ'D
1	5712-09869-00	IC1	BARE P.C. BOARD	1
2	5280-09013-00	IC2	I.C., 7404 HEX INVERTER	1
3	5430-08972-00	IC3	I.C., MC6821 PIA	1
4	5281-09465-00	IC4, IC5, IC7	I.C., 74LS257	3
5	5310-08975-00	IC6, IC8, IC9	I.C., 4049 INV. HEX BUFFER	4
6	5010-08991-00	RI, R2, R3	RESISTOR, 47K Ω 1/4W 5%	3
7	5019-09796-00	SRI	SIP 47K Ω 5R 6-PIN 5% .125 W/R @ 70°C	1
8	5019-09362-00	SR2, SR3	SIP 47K Ω 9R 10-PIN 5% .125 W/R @ 70°C	2
9	5043-09845-00	C10, C13	CAP, AXIAL, 1000 PF, 50V	49
10	5043-08996-00	C11	CAPACITOR, AXIAL, .1 μ F, 50V \pm 20%	1
11	5040-09421-00	C12	CAPACITOR, RADIAL, 100 μ F 25V + 50% 10%	1
12	5551-09822-00	L1	COIL, 47 μ H 3A	1
13	5551-09825-00	L2 THRU L25	COIL, 4.7 μ H 30mA	24
14	5791-09043-00	3J2	HEADER 12-PIN, 09-65-1121	1
15	5791-09074-00	3J3	HEADER 15-PIN, 09-65-1151	1
16	5795-09540-00	3P1	20 PIN RIBBON CABLE ASSY.	1
17	5043-08980-00	C1 THRU C9	CAP. AXIAL, CERAMIC, .01 MFD. 50V + 80 - 20%	9
18	5000-09534-00	W1	RESISTOR, C.F. 0 Ω	0



C-8783 Interface Board Assembly and Logic Diagram



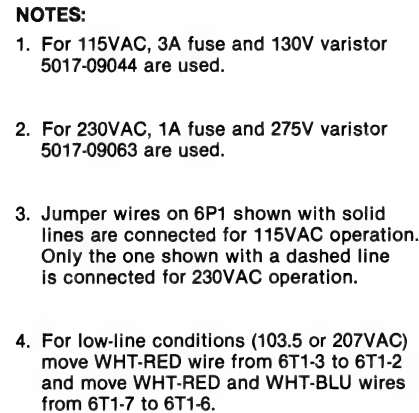
- NOTES:
1. REMOVE R24 IF +5VDC IS GREATER THEN 5.25 VDC, REMOVE R10 IF +5VDC IS LESS THAN 4.75 VDC.
 2. BR1 MUST BE MOUNTED 1/8" ABOVE SURFACE OF BOARD.
 3. FOR SCHEMATIC REFER TO 16-8811.

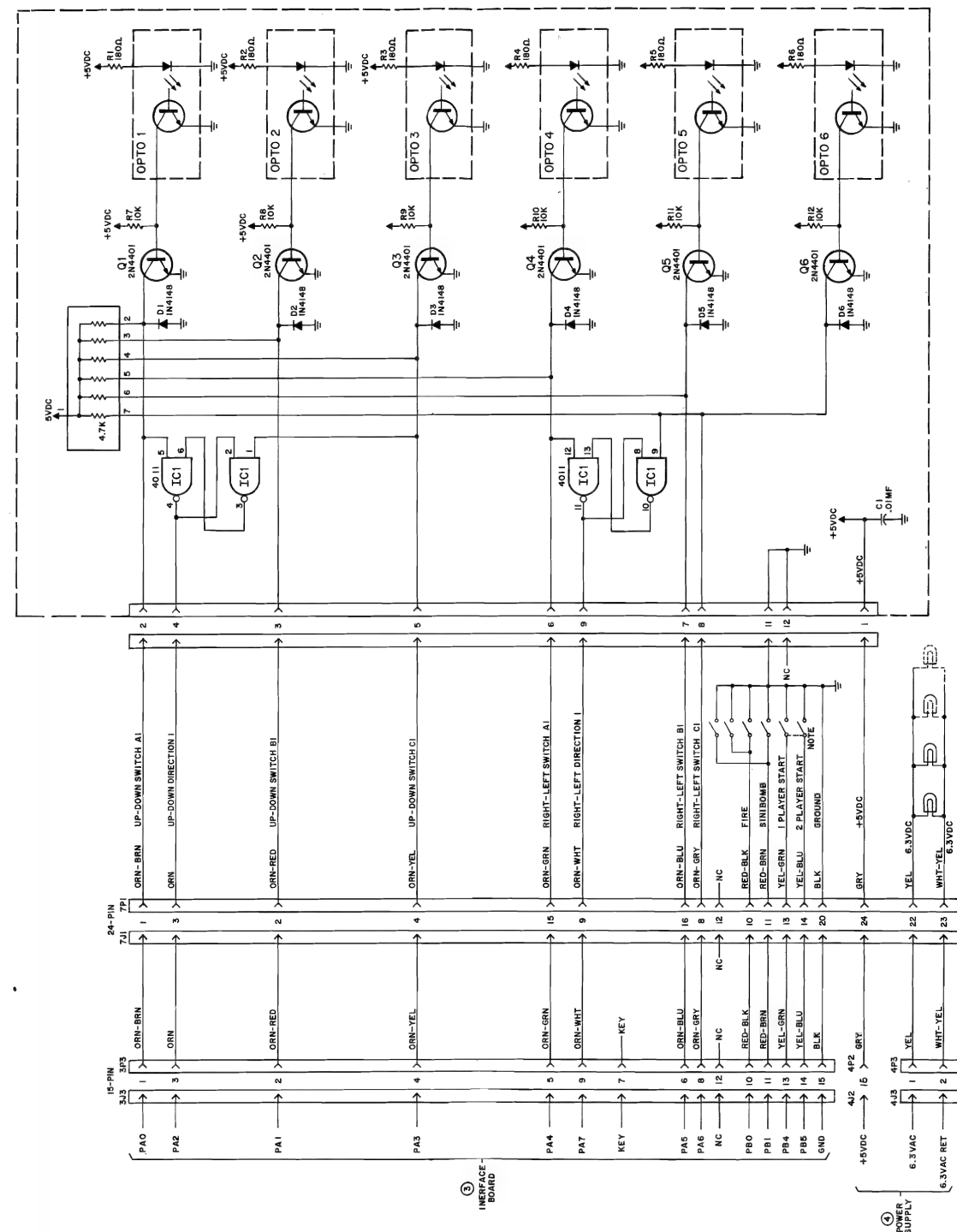
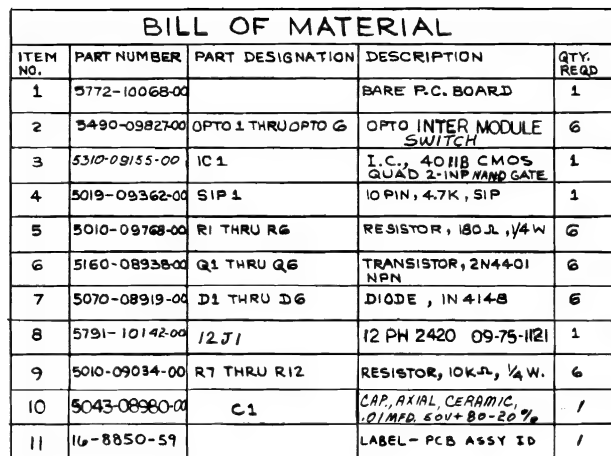
55	5010-09682-00	R10	RESISTOR C.F. 51K ± 5% 1/4W	1
56	5010-09324-00	R24	RESISTOR C.F. 27K ± 5% 1/4W	1
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.

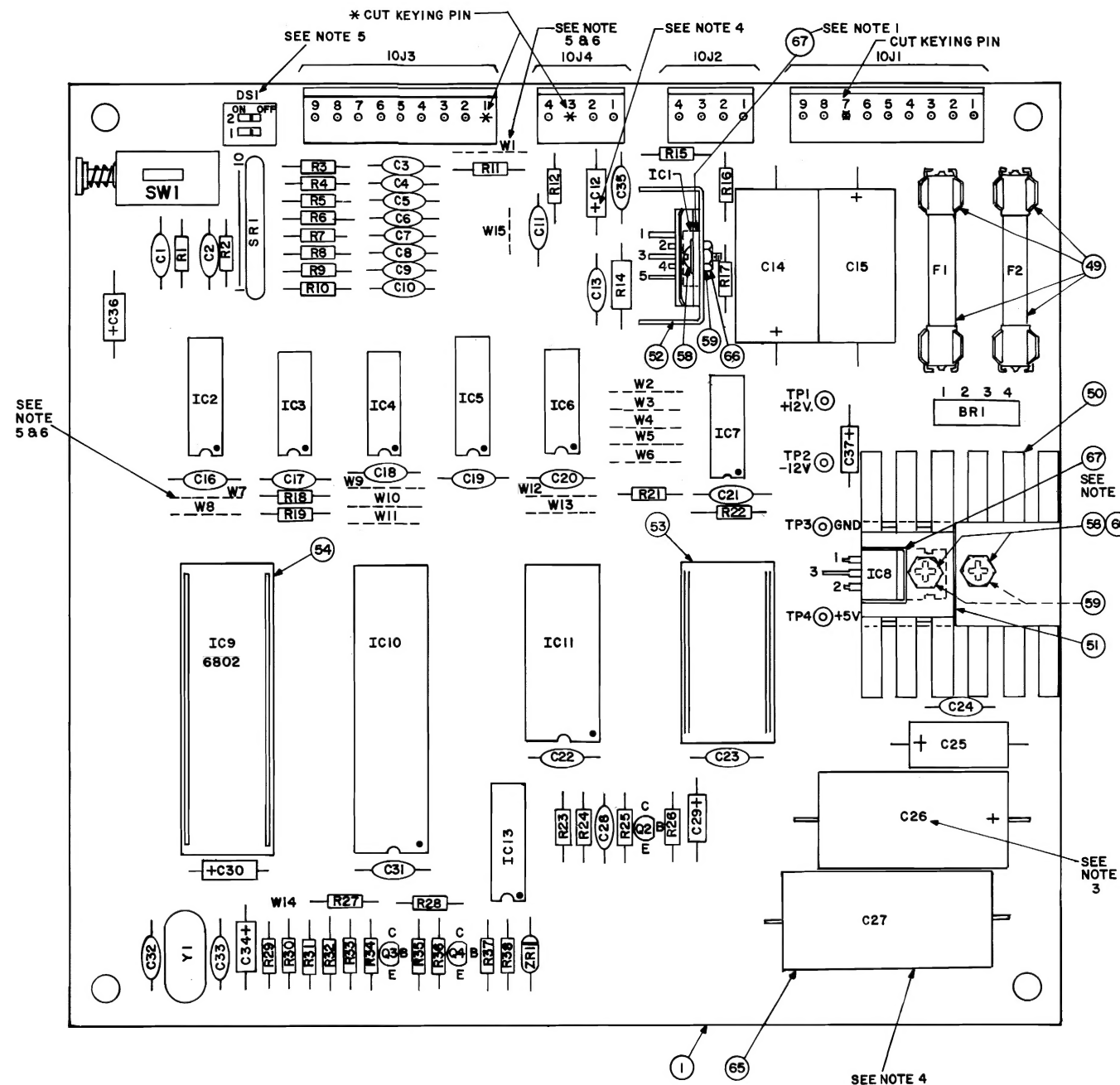
45	5731-09432-00	F4 & F5	FUSE, 7A, S.B.	2
46	5731-06314-00	F3	FUSE, 4A, S.B., 250V	1
47	5731-06569-00	F1	FUSE, 1A, S.B., 250V	1
48	5731-09651-00	F2	FUSE, 5A, S.B., 250V	1
49	5732-09178-00		FUSEHOLDER,	10
50	03-7520		TIE WRAP	1
51	5791-09074-00	4J1 & 4J2	HEADER, 15 PIN 09-65-1151	2
52	5791-09032-00	4J3	HEADER, 6 PIN 09-65-1061	1
53	5791-09497-00	4J4	HEADER, 1 PIN 09-65-1071	1
54	5705-09663-00		HEAT SINK	2
	5705-09688-00		HEAT SINK	0

BILL OF MATERIAL

ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.
1	5773-09679-00		BARE P.C. BOARD	1
2	5010-09085-00	R23	RESISTOR, 1.5K 5%, 1/4W	1
3	5010-09541-00	R13, R15	RESISTOR, 2.7K 2%, 1/4W	2
4	5010-09508-00	R21	RESISTOR, 270Ω 2%, 1/4W	1
5	5010-09428-00	R20	RESISTOR, 1.5K 2%, 1/4W	1
6	5010-09509-00	R16	RESISTOR, 1.1K 2%, 1/4W	1
7	5010-09510-00	R7	RESISTOR, 12K 2%, 1/4W	1
8	5010-09314-00	R4	RESISTOR, 1.2K 5%, 1/4W	1
9	09416-00	R1, R14	RESISTOR, 470Ω 5%, 1/4W	2
10	5013-09542-00	R11	RESISTOR, 7.32K 1%, 1/4W	1
11	5013-09427-00	R12	RESISTOR, 4.99K 1%, 1/4W	1
12	5013-09426-00	R25	RESISTOR, 2.15K 1%, 1/4W	1
13	5012-09429-00	R3	RESISTOR, .12Ω 5%, 5W	1
14	5012-09512-00	R2	RESISTOR, .27Ω 5%, 5W	1
15	5012-09037-00	R27	RESISTOR, 0.41Ω 5%, 3W	1
16	5013-09665-00	R26	RESISTOR, 5.11K 1%, 1/4W	1
17	5010-09434-00	RG, R18	RESISTOR, C.F. 22Ω ± 5% 1/4W	2
18	5010-09036-00	R5, R9, R17 & R22	RESISTOR, C.F. 100Ω ± 5% 1/4W	4
19	5010-09039-00	R8, R19	RESISTOR, C.F. 10Ω ± 5% 1/4W	2
20	5010-09534-00	W1	RESISTOR, 0Ω	1
21	5043-08996-00	C6, C7	CAPACITOR, 0.1μF CERAMIC +80% -20% 50V	2
22	5040-09421-00	C2, C16	CAPACITOR, 100MFD, 25V RADIAL +50% -10%	2
23	5040-09422-00	C15	CAPACITOR, 47MFD, 50V RADIAL +50% -10%	1
24	5040-09420-00	C3	CAPACITOR, 1000MFD, 25V RADIAL +75% -10%	1
25	5040-09419-00	C10	CAPACITOR, 18,000MFD 20V AXIAL +75% -10%	1
26	5040-09423-00	C5	CAPACITOR, 330MFD 10V RADIAL +50% -10%	1
27	5040-09504-00	C14	CAPACITOR, 4700MFD 35V RADIAL +50% -10%	1
28	5043-09446-00	C1, C4 & C12	CAPACITOR, 1MFD, 50V AXIAL 25V -20 +80%	3
29	5043-08065-00	C9	CAPACITOR, 470PFD 50V AXIAL XTR ± 10%	1
30	5043-09492-00	C8	CAPACITOR, 100PFD 50V AXIAL S2L ± 5%	1
31	5040-09506-00	C13	CAPACITOR, 220MFD 16V RADIAL +50% -10%	1
32	5040-09493-00	C11	CAPACITOR, 22MFD 10V RADIAL +50% -10%	1
33	5070-06258-00	D1, D2 & D3	DIODE, 1N4001	3
34	5075-09406-00	ZR1	ZENER, 1N5234 ± 5% (6.2V)	1
35	5075-09662-00	ZR2	ZENER, 1N5244 ± 5% (14V)	1
36	5190-09430-00	Q3, Q4	TRANSISTOR, MPS ASS	2
37	5130-09661-00	Q1, Q2	SCR, 8 AMP, 100V	2
38	5250-09515-00	Q5	VOLTAGE REGULATOR, 7905	1
39	5460-09424-00	IC1, IC2	VOLTAGE REGULATOR, 723	2
40	3100-09699-00	BR1	BRIDGE RECTIFIER, 35 AMP, 200V	1
41	5100-09513-00	BR2	BRIDGE RECTIFIER, 4.0A, 50V	1
42	5100-09514-00	BR3	BRIDGE RECTIFIER, 1.0A, 50V	1
43	5671-09018-00	LED1, LED2, LED3	LED, RED	3
44	5824-09248-00	TP1 - TP6	TERMINAL #1502-1 (TEST POINT)	4







JUMPERS USED	TOM TYPE	FORMAT	GAMES USED IN
W2, W5, W7, W9, W10, W15	2K x 8 2516, 2716	Sound & Speech	Gorgar, Blackout, Firepower, Black Knight, Jungle Lord, Pharaoh.
W1, W2, W5, W7, W9, W10, W15	2K x 8 2516, 2716	Sound Only	Defender Video & Pin, Solar Fire, Barracora, Hyperball, Stargate, Cosmic Gunfight, Varkon, Time Fantasy.
W3, W4, W5, W7, W10, W15	4K x 8 2532	Sound & Speech	Sinistar (Upright & Cockpit Front)
W1, W3, W4, W5, W7, W10, W15	4K x 8 2532	Sound Only	Robotron, Joust Video & Pin, Bubbles, Sinistar (Cockpit Rear)
W1, W2, W4, W5, W7, W10, W15	2K x 8 2516, 2716	Sound Only	Warlock
W1, W3, W6, W7, W9, W11, W12, W15	512 x 8 7641	Sound Only	Big Strike

ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D. NO.
1	01-2 01-146-6		BARE P.C. BOARD REV F	1
2	5370-09156-00	IC1	TDA 2002 V AUDIO AMPLIFIER	1
3	5280-09012-00	IC2	7442 BCD-DEC DECODER	1
4	5280-09073-00	IC3	7400 QUAD 2 INPUT NAND	1
5	5280-08973	IC4	7408 QUAD 2 INP. AND GATE	1
6	5310-09153-00	IC5	4050 BUFFER	1
7	5310-09154-00	IC6	4068 8 INPUT NAND GATE	1
8	5310-08971-00	IC7	4069 HEX INVERTER	1
9	5250-09157-00	IC8	7805 5 VOLT REG. W/TO 220 CASE	1
10	5430-08972-00	IC10	6821 P.I.A.	1
11	5340-09003-00	IC11	6810 RAM	1
12	5371-09152-00	IC13	1408 D/A CONVERTER	1
13	5160-08938-00	Q2, Q3, Q4	2N4401 NPN TRANSISTOR	3
14				
15	5075-09018-00	ZR1	1N5996A 6.8V ZENER DIODE	1
16				
17	5100-09357-00	BR1	MDA 200/3N253	1
18	5100-09158-00		BRIDGE RECTIFIER	0
19	5520-09020-00	Y1	3.58 MHz CRYSTAL	1
20	5010-08991-00	R1, R18, R19, R21, R22, R27, R30, R31, R32	RESISTOR, FC, 4.7K OHM, 5% 1/4 WATT	9
21	5010-09036-00	R2 thru R10	RESISTOR, FC, 100 OHM, 5% 1/4W	9
22	5010-09158-00	R12, R15, R28, R36, R38	RESISTOR, FC, 1K OHM, 5% 1/4W	5
23	5010-09181-00	R14	RESISTOR, FC, 1 OHM, 10% 1/2 WATT	1
24	5010-09161-00	R16	RESISTOR, FC, 2.2 OHM, 5% 1/4 WATT	1
25	5010-09361-00	R17	RESISTOR, FC, 220 OHM, 5% 1/2 WATT	1
26	5010-08983-00	R23, R24, R26	RESISTOR, FC, 3.3K OHM, 5% 1/4 WATT	3
27	5010-09179-00	R25	RESISTOR, FC, 3.3M OHM, 5% 1/4 WATT	1
28	5010-09035-00	R29	RESISTOR, FC, 47K OHM, 5% 1/4 WATT	1
29	5010-09034-00	R33, R35, R37	RESISTOR, FC, 10K OHM, 5% 1/4 WATT	3
30	5010-09039-00	R34	RESISTOR, FC, 10 OHM, 5% 1/4 WATT	1
31	5043-08980-00	C1, C16 thru C23, C31	CAPACITOR, CER. .01 MFD. 50V. +80%, -20%	10
32	5043-09065-00	C2 thru C10	CAPACITOR, CER. 470 PFD. 50V. +20%	9
33	5043-09345-00	C11	CAPACITOR, CER. .001 MFD. +20% 100V.	1
34	5040-09365-00	C12, C30, C36	CAPACITOR, ELECT. 1 MFD. 63V. -10 +50%	3
35	5043-08996-00	C13, C24, C35	CAPACITOR, CER. .1 MFD. 50V. +20%	3
36	5040-09165-00	C14	CAPACITOR, ELECT. 1,000 MFD. 16V. +20%	1
37	5040-09164-00	C15	CAPACITOR, ELECT. 470 MFD. 10V. +20%	1
38	5040-08986-00	C25	CAPACITOR, ELECT. 100 MFD. 10V. +20%	1
39	5040-08993-00	C26	CAPACITOR, ELECT. 1,000 MFD. 25V. +20%	1
40	5040-09376-00	C27	CAPACITOR, ELECT. 4700 MFD. 16V. +20%	1
41	5043-09180-00	C28	CAPACITOR, CER. 47 PFD. 1K V. +20%	1
42	5040-09343-00	C29	CAPACITOR, ELECT. 10 MFD. 20V	1
43	5043-09169-00	C32, C33	CAPACITOR, CER. DISC, 27 PFD. 1KV. +10%	2
44	5041-09163-00	C34	CAPACITOR, TANTALUM 2.2 MFD. 15V. +20%	1
45	5041-09031-00	C37	CAPACITOR, TANTALUM 1 MFD. 25V. +20%	1
46	5641-09658-00	SW1	MOMENTARY SWITCH SPDT	1
47	5645-09330-00	DS1	2 STD. DIP SWITCH	1
48	5731-06314-00	F1, F2	4 AMP SLOW BLOW FUSE	2
49	5732-09178-00		FUSEHOLDER	4
50	5705-09172-00		HEAT SINK THERMALLOY #6072B	1
51	5705-09173-00		HEAT SINK THERMALLOY #6071B	1
52	5705-09199-00		HEAT SINK THERMALLOY #6030	1
53	5700-09004-00		24 PIN SOCKET	1
54	5700-08985-00		40 PIN SOCKET	1
55	5791-09027-00	10J1, 10J3	9 PIN MALE CONNECTOR 09-65-1091	2
56	5791-09028-00	10J2, 10J4	4 PIN MALE CONNECTOR 09-65-1041	2
57				
58	4006-01003-06		6-32x3/8" P-PH-S	3
59	4406-01117-00		6-32 HEX NUT	3
60	5010-09534-00		0 OHM RESISTOR	A/R
61	5824-09248-00	TP1 THR TP4	TERMINAL #1502-1	4
62	5010-09363-00	R11	RESISTOR, FC, 5.6K OHM 5% 1/4 WATT	1
63				
64	5019-09362-00	SR1	RESISTOR, 4.7K OHM 10 PIN SIP	1
65	03-7520-1		TIE WRAP	1
66	4703-00007-00		#6 EXT. LOCKWASHER	3
67	20-9229		THERMAL COMPOUND	.01

NOTES:

1. USE THERMAL COMPOUND BETWEEN IC1 AND IC8, AND HEAT SINKS.

2. CAUTION: AVOID STATIC DISCHARGE DAMAGE TO MOS LOGIC.

3. SYMBOLS SHOWN ON COMPONENTS ARE FOR REFERENCE ONLY.

DO NOT SCREEN OR STAMP.

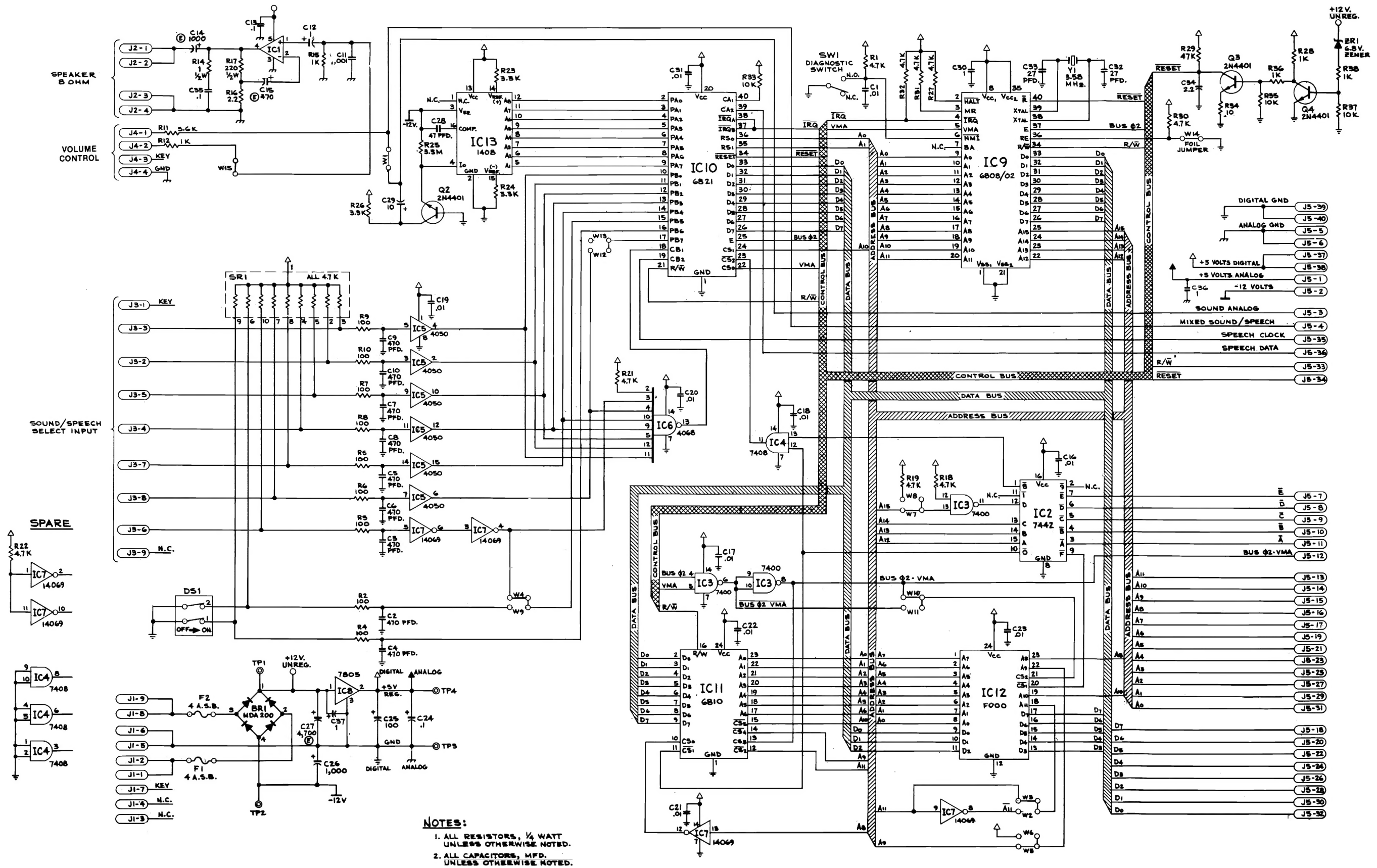
4. OBSERVE INDEX MARK OF ALL INTEGRATED CIRCUITS;

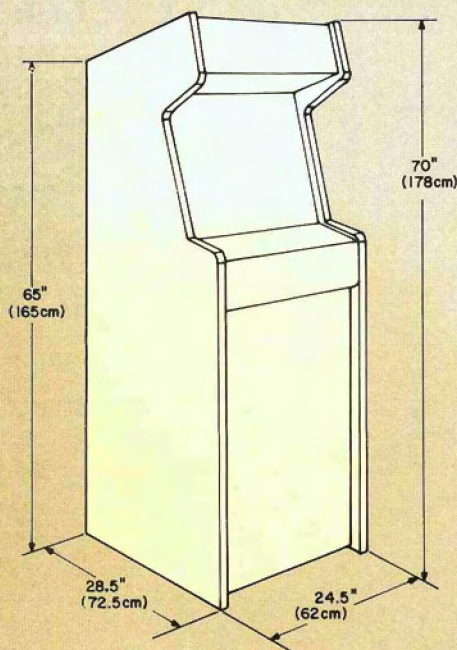
DIODES D1, D2, AND ZR1;

CAPACITORS C12, C14, C15, C25, C26, C27;

CONNECTORS 10J1, 10J2, 10J4, 10J3, 10J5;

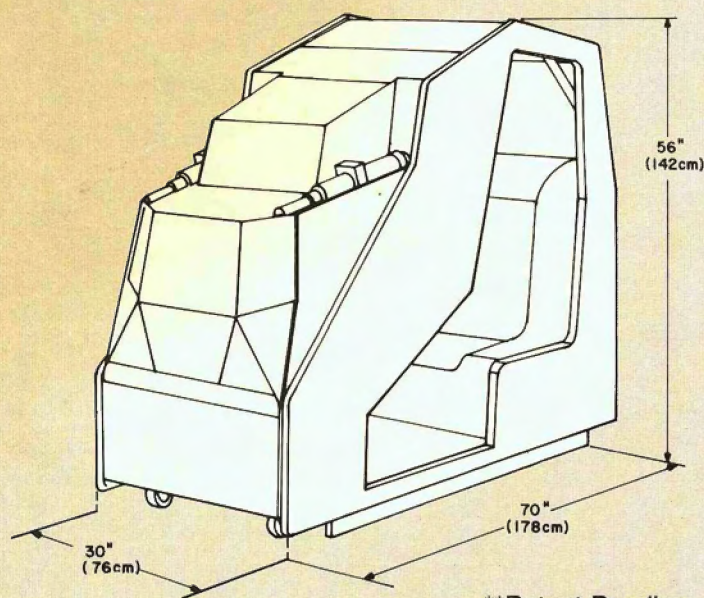
POSITION OF TRANSISTORS Q1, Q2, Q3, Q4.





UPRIGHT:
Weight
270 lbs. (122.5 kg.) uncrated
290 lbs. (131.5 kg.) crated

COCKPIT:
Weight
342 lbs. (155 kg.) uncrated
402 lbs. (182.5 kg.) crated



****Patent Pending**
Specifications subject to change without notice.

POWER REQUIREMENTS

115/230VAC Nominal, 50/60Hz
@1.7/0.85A 192W
(20A surge for one cycle at power turn on)

Normal Line = 98-126VAC
196-252VAC

High Line* = 113-145VAC
226-290VAC

Low Line* = 88-113VAC
176-226VAC

*Transformer jumpers required.
See service manual.

ENVIRONMENT

Operating Temperature
0° to +45°C ambient
(+32° to +113°F)

Storage Temperature
-40° to +65° C ambient
(-40° to +149°F)
90% RH at 40°C (104°F), non-condensing

MONITOR

19" Color Raster
non-interlaced
UL, CSA & DHHS Approved

VIDEO SYSTEM**

256 Colors, 340 x 240 PIXEL Resolution
6809E Microprocessor
ROM: 44K BYTES
Video and Scratch RAM: 50K BYTES
CMOS RAM: 1Kx4
Special RAM: 2K BYTES

SOUND SYSTEM

6808 Microprocessor
ROM: 24K BYTES (cockpit)
U.S. Patent No. 4272649

SPEECH SYSTEM**

Digital to Analog
CVSD System

JOYSTICK**

Optical Sensing
49 discrete directions and degrees of movement
(6 separate speeds in 8 directions plus center off position)

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been certified to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to correct the interference.

SERVICE

For the back-up that keeps you out-front,
call Williams toll-free at 800/621-1253.
In Illinois, call toll-free at 800/572-1324.

Williams®
ELECTRONICS, INC.
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(312) 267-2240, Telex 253095